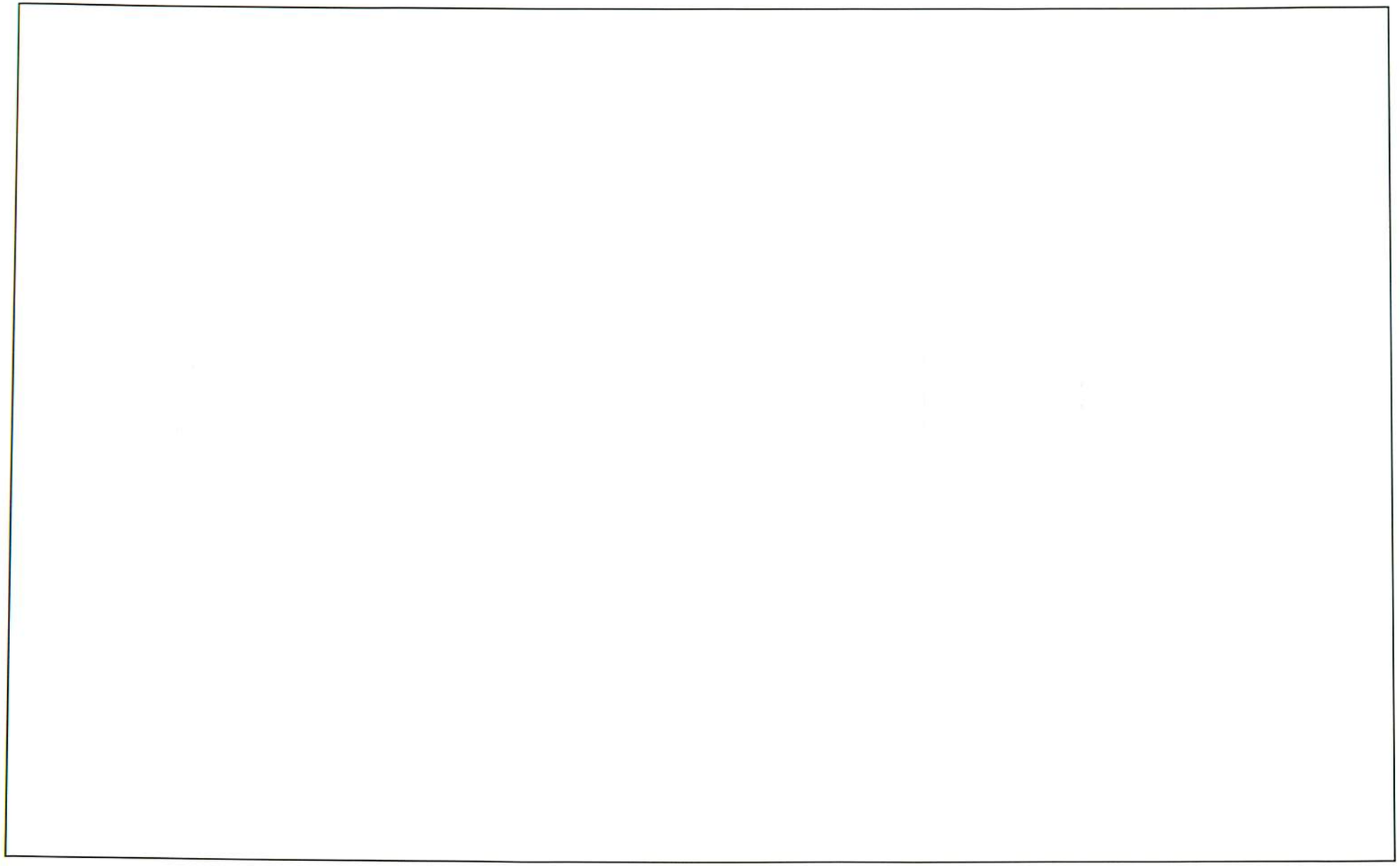


ENVIROMET is a package of environmental services and products offered by the Met. Office Environmental Consultancy branch, which exists to research, develop, produce, market and sell its products and services to a wide range of potential customers such as National and Local Government, Environmental Consultants, National River Authorities, Petro-Chemical Operators, Environmental Monitors, Sewage and Landfill Managers and many more; indeed anyone with an interest in the Environment will find that ENVIROMET has something to offer.

The Meteorological Office has been, and continues to be, active in many areas of research and development into products and services which have environmental applications.

Our long experience in using related products and services in other areas of our work, such as Defence and Agriculture, has enabled us to put together a diverse range of services, suitable for use in the general environmental area, as a coherent package under one umbrella; thus ENVIROMET was set up in September 1993.

The ENVIROMET package will continue to expand over the coming years, as the Environmental Consultancy branch spreads its wings internationally and develops and updates its services and products in response to customer demand. We intend to tailor specific packages to individual clients, whether large or small; we have the resources and back-up of Met. Office computing power, research and development expertise, communications links worldwide, together with a determination to produce good quality products and services at a marketable price which you, our potential customer, will be able to use to fulfil your needs.

If you would like further information please contact the Environmental Product Manager or Commercial Services Manager, ENVIROMET, Meteorological Office, Johnson House, London Road, Bracknell, Berkshire, RG12 2SY, UK.

Telephone: 01344 856505. Fax: 01344 856151.

We will be happy to discuss any products or services which we could adapt or develop for YOU.

LONG-RANGE POLLUTION DISPERSION

Radioactivity, some gases and fire/volcano emissions can travel in noticeable concentrations over large distances from their sources, driven by air movements around weather systems.

After the Chernobyl incident in April 1986 the Met. Office started to develop a model which could analyse the distribution of materials from such events. The model (given the acronym NAME) was successfully developed to simulate the transport and deposition of airborne pollutants, whether they were radioactive, chemical or biological, over distances of hundreds or thousands of kilometres.

NAME was run operationally during the Gulf War, providing invaluable information on the behaviour of smoke plumes from the burning oil wells. The model continues to be run for planning purposes for the UK government, and in an emergency affecting the UK the results will be available through normal government channels. However, NAME is now available commercially to be used for planning contingency purposes, both in the UK and overseas, and we are able to arrange the setting up of emergency runs of the model for overseas operations.

Features of NAME

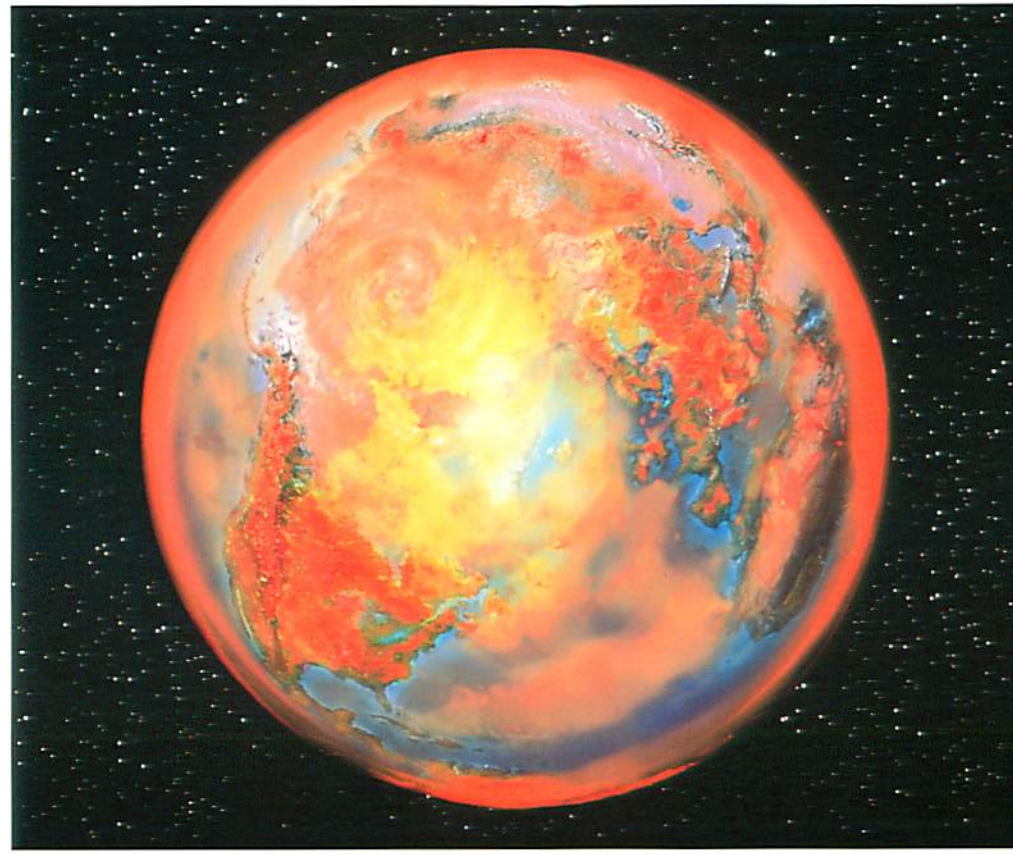
- Lagrangian atmospheric dispersion model, which simulates the spread of airborne pollutants by releasing particles into the "model atmosphere" and allows them to be passively carried along by the winds and spread by small-scale diffusion.
- Atmospheric details input from Met. Office historical data banks or from real-time or model forecast fields.
- NAME grid size 50 km worldwide (16 km grid under development).
- Takes account of vertical as well as horizontal dispersion.
- Models radioactive decay and dry and wet deposition of pollutants.
- Research is under way to incorporate some chemical transformations.

NAME applications

- To identify the sources, the trajectory dispersion and the rate of deposition of a pollutant, using our historical database of weather information for past events, using current and forecast weather data in the management of current pollution events.
- To identify areas at long-term risk from emissions from airborne pollutant sources, such as power stations or large industrial areas.
- To assess and predict national levels of background pollutants from major sources on a regular basis.
- To identify transboundary transport of pollutants

Advantages and benefits of using NAME

- Tried and tested state-of-the-art model, being improved all the time.
- Reliable weather data input from our world renowned computing centre incorporating our high-resolution radar rainfall for wet deposition. Available now for analysis and planning purposes.
- Forecasts available up to five days ahead for anywhere in the world may be set up as a routine service or for a sudden emergency.
- Ensures best available information for use in planning and emergencies, thus minimises waste of effort and same resources.
- Users can be seen to be meeting legal and environmental needs.



Examples of users

- Environmental consultants.
- Local and National government planners and regulators.
- Emergency planners.
- Research Scientists.
- Environmental Health Departments.
- Overseas Government departments (including Defence, Health, Environment and Industry).
- Power generation industry.

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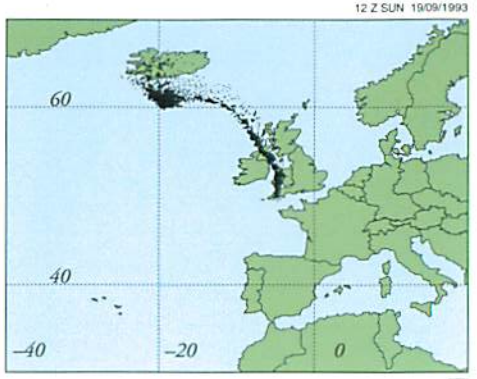
Continuous emission of pollutants from a hypothetical event in Cornwall

Examples of part of the NAME model output for midday on the 19th of September 1993 for release starting on the 17th of September 1993

TRAJECTORY END POINTS IN BOUNDARY LAYER

RELEASE FROM 1200GMT 17/09/1993 – CONTINUING

12 Z SUN 19/09/1993

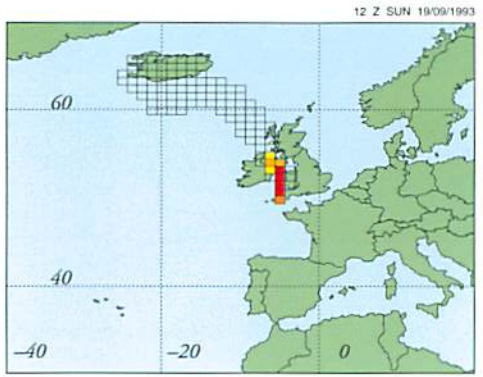


AIR CONCENTRATION (BQ/M^3) FOR CAESIUM-137 IN BOUNDARY LAYER

>0 – 1.01	1.94 – 3.72	7.15 – 13.72
1.01 – 1.94	3.72 – 7.15	13.72 – 26.33

RELEASE FROM 1200GMT 17/09/1993 – CONTINUING

12 Z SUN 19/09/1993

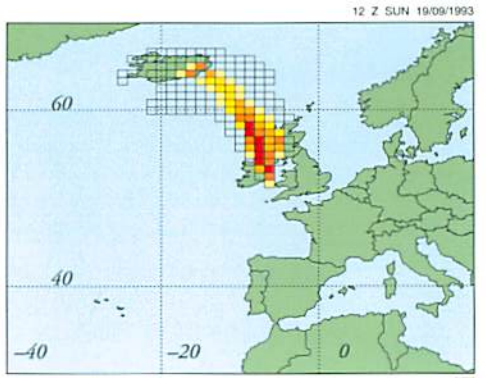


ACCUMULATED WET DEPOSITION (KBQ/M^2) FOR CAESIUM-137

>0 – 1.35	2.60 – 4.98	9.56 – 18.35
1.35 – 2.60	4.98 – 9.56	18.35 – 35.22

RELEASE FROM 1200GMT 17/09/1993 – CONTINUING

12 Z SUN 19/09/1993

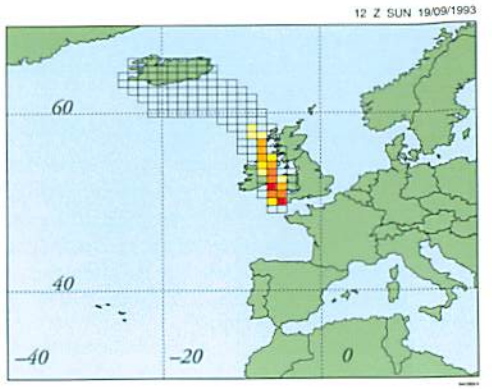


ACCUMULATED DRY DEPOSITION (KBQ/M^2) FOR CAESIUM-137

>0 – 0.9	0.18 – 0.34	0.66 – 1.26
0.9 – 0.18	0.34 – 0.66	1.26 – 2.42

RELEASE FROM 1200GMT 17/09/1993 – CONTINUING

12 Z SUN 19/09/1993

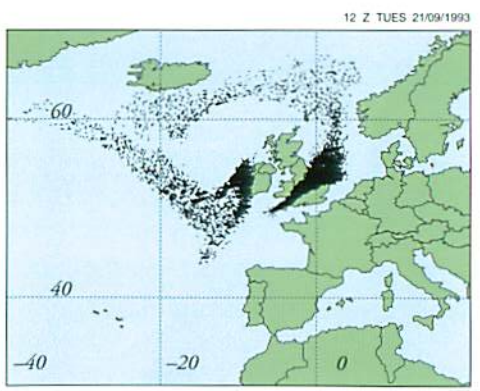


Examples of the trajectory of the same plume/event on the 21st of September 1993

TRAJECTORY END POINTS IN BOUNDARY LAYER

RELEASE FROM 1200GMT 17/09/1993 – CONTINUING

12 Z TUES 21/09/1993

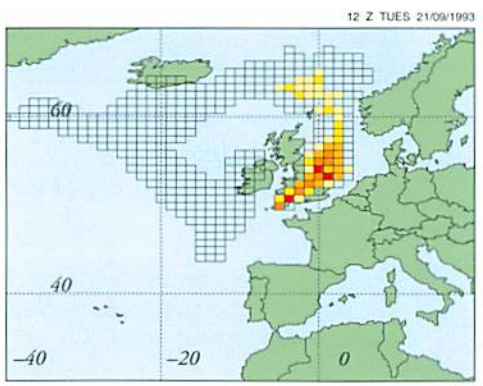


AIR CONCENTRATION (BQ/M^3) FOR CAESIUM-137 IN BOUNDARY LAYER

>0 – 1.61	3.08 – 5.92	11.36 – 21.80
1.61 – 3.08	5.92 – 11.36	21.80 – 41.85

RELEASE FROM 1200GMT 17/09/1993 – CONTINUING

12 Z TUES 21/09/1993

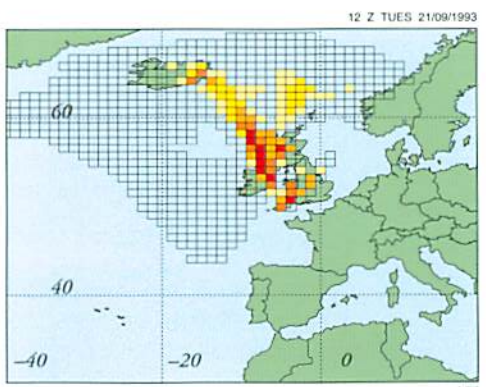


ACCUMULATED WET DEPOSITION (KBQ/M^2) FOR CAESIUM-137

>0 – 1.35	2.59 – 4.98	9.56 – 18.35
1.35 – 2.59	4.98 – 9.56	18.35 – 35.22

RELEASE FROM 1200GMT 17/09/1993 – CONTINUING

12 Z TUES 21/09/1993

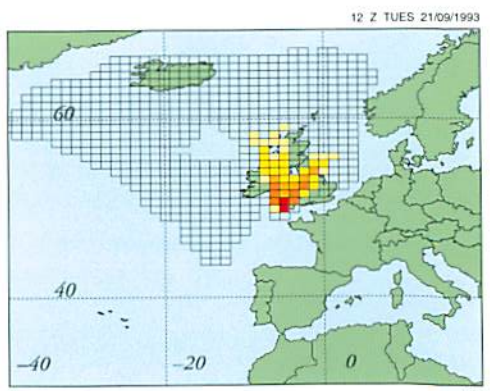


ACCUMULATED DRY DEPOSITION (KBQ/M^2) FOR CAESIUM-137

>0 – 0.14	0.28 – 0.53	1.01 – 1.95
0.14 – 0.28	0.53 – 1.01	1.95 – 3.74

RELEASE FROM 1200GMT 17/09/1993 – CONTINUING

12 Z TUES 21/09/1993



For further information contact:
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ENVIRONMENTAL DATA SERVICES

The Met. Office offers a large range of quality weather data, combined into datasets for a variety of uses. Examples of the range of datasets are shown on this leaflet

Data For Dispersion Models

Normalised Percentage Frequency Analysis of wind direction, wind speed and Pasquill Stability Category. Dataset of specific hourly Meteorological Parameters together with morning and afternoon Mixing Heights for direct input.

Climatological Summary

Analysis of means and extreme values of selected weather parameters. Long Period Analysis or Short Period Analysis (up to 10 years) is available.

Basic Pasquill Stability Category Analysis

Frequency Analysis of Pasquill Stability Category as a function of hours and months.

Pasquill Stability Analysis

Frequency Analysis of Pasquill Stability Category as a function of hours, months, wind speed and direction.

Boundary Layer Depth Analysis

Frequency Analysis of Boundary Layer depth and Pasquill Stability Category as a function of hours and months as well as a Frequency Analysis of Pasquill Stability as a function of hours, months, wind speed and direction.

UK–ADMS

Frequency Analysis of Wind Speed and Direction, Surface Sensible Heat Flux, Boundary Layer Depth and precipitation for specified hours, months and years. Formatted as appropriate for input into the UK Atmospheric Dispersion Modelling System (UK–ADMS). Hourly Data for a period of 1 year for direct input into UK–ADMS is also available.

Data For Almanac Dispersion Model

Frequency Analysis of wind speed and direction and Total Cloud Amount as a function of season.

Wind Frequency Analysis

Numeric representation of wind speed for 30-degree sectors for a 10-year period. Month, Seasonal and annual Analyses are available.

Wind Rose Analysis

Pictorial representation of wind speed for 30 degree sectors for a 10-year period. Month, Seasonal and annual Analyses are available.

Local Wind Climatology

Statistical techniques are used to generate wind speed and direction frequencies for any location in the UK, based on actual nearby data.

Inversion Frequency Analysis

Number of Inversions as a function of Layers above the surface. Inversions within these layers being described in terms of thicknesses and temperature differences. Analysis in terms of total number of inversions, mean annual and mean seasonal values. Analysis is run over a 1-year period.

Upper-Air Data

An Upper-Air Ascent giving temperature, dew-point, relative humidity, wind speed and direction at given pressure/height levels (for 00 or 12 GMT).

Most Analyses are run over a 10-year period depending on met. data available.

Consultancy Services also available.

ADVANTAGES AND BENEFITS.

- ❑ Quality controlled to Met. Office standards, giving you peace of mind.
- ❑ Non-standard forms of datasets can be compiled for you, saving you staff time and costs involved in manipulation of data.
- ❑ Large range of stations and datasets to choose from, giving you specific information for your locality and saving your resources.

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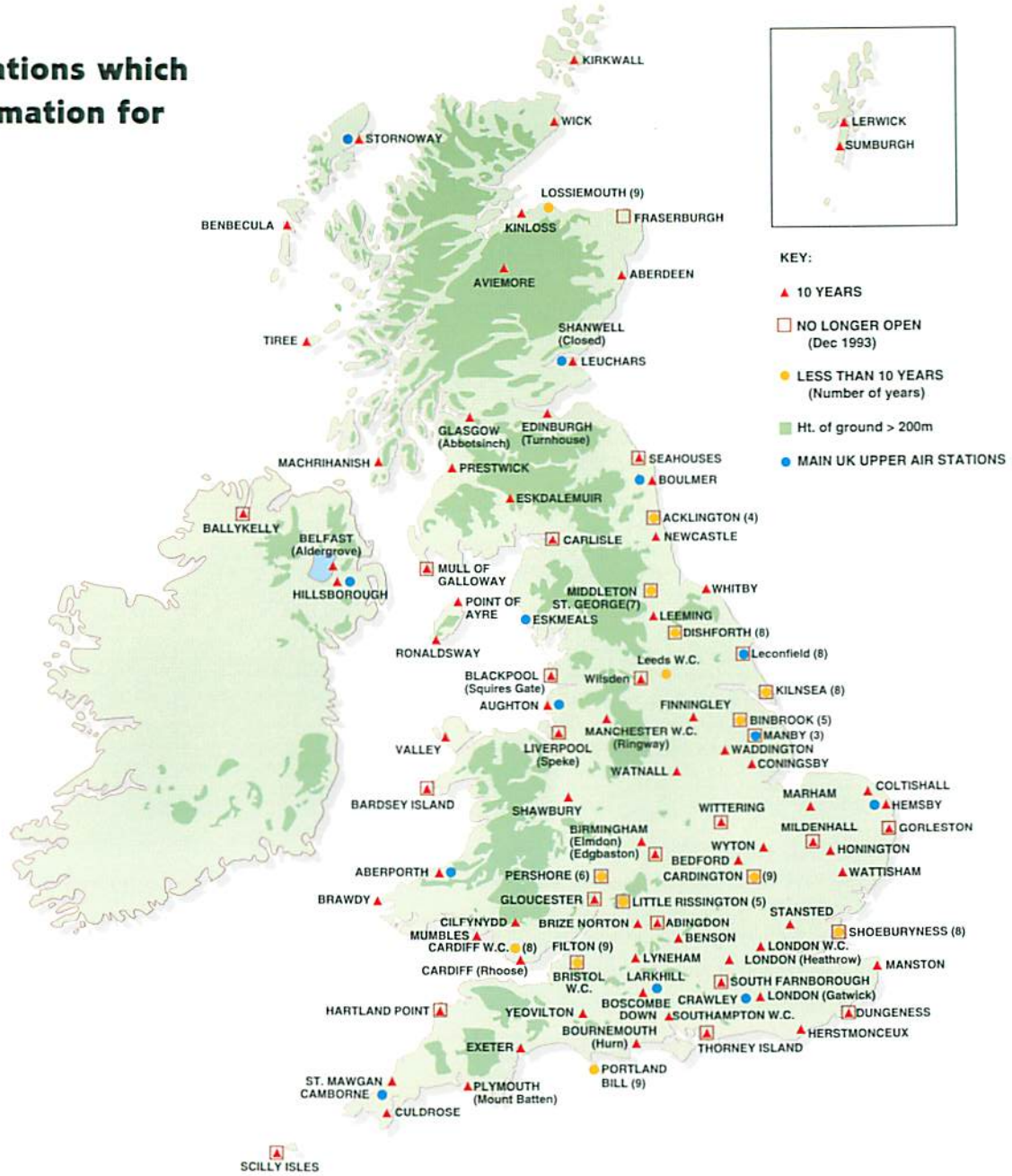
Map showing stations which can supply information for data services



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LANDFILL MANAGEMENT

The Met. Office can assist in two crucial areas of landfill management:

- ❒ **OUTGASSING**
- ❒ **LEACHING**

OUTGASSING

The link between the volume of methane produced from landfill sites and changes in atmospheric air pressure is well established.

The Met. Office, using its range of state-of-the-art mesoscale, european and global computer modes, can offer:

Daily forecasts of site-specific surface air pressure at six-hourly intervals up to one hundred and twenty hours ahead.

The Met. Office also offers a consultancy service which will advise operators on weather related problems at their sites.

LEACHING

Less precise but no less useful estimates of soil moisture and effective precipitation (i.e. that precipitation not taken up by the soil/landfill and plants) are produced each week. For site assessment, long-period averages and extremes of these values are calculated using the nearest rain-gauge which will probably be less than 5 km away. Further information about this system (called MORECS) is given on the other side of this leaflet.

ADVANTAGES AND BENEFITS FOR LANDFILL MANAGEMENT

- ❒ Forewarning as to which bore holes need attention.
- ❒ Savings in resources by better focusing of effort.
- ❒ Identification of potential leachate problems before a site is opened.
- ❒ Better day-to-day management of leaching from existing landfill.
- ❒ Identifing possible problems early, enabling you to take relatively inexpensive remedial action.
- ❒ Using these services indicates to the public your concern for their well being, thus ensuring less opposition to future landfill development.

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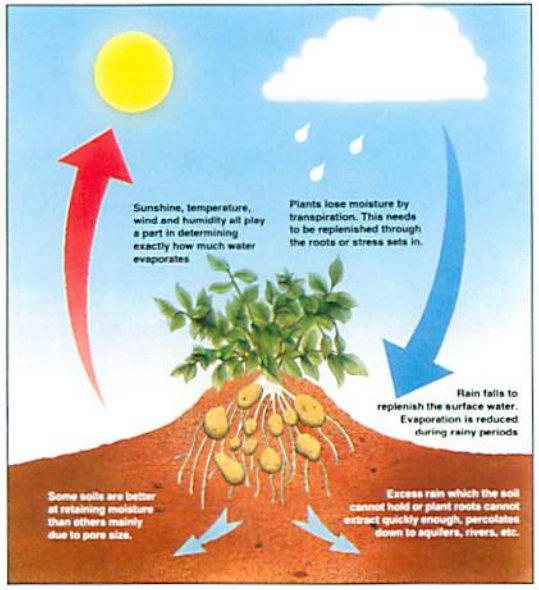
Keeping the balance with MORECS

MORECS is the generic name for Met. Office services involving the calculation of soil moisture and evaporation routinely for Great Britain. At the heart of the MORECS system is a complicated equation for calculating evaporation from the standard weather elements of temperature, sunshine, wind and humidity. The equation also needs information about soil structures and the way different crops extract moisture from the soil and then transpire.

This enables different crops on three different soil types to be analysed individually, so that most growing scenarios can be catered for.

MORECS calculates evaporation and soil moisture either for 40 km x 40 km squares on a weekly operational basis,



or at individual weather recording sites for hindsight studies. MORECS has some distinct advantages over the direct methods. Firstly, it gives a consistent nationwide assessment of the general soil moisture status over an area for those who need to know national or regional moisture status. Secondly, a long-period record can be generated instantaneously for a particular site, enabling extremes, averages and return periods to be calculated. To do either task by direct measurement would be both costly and laborious.

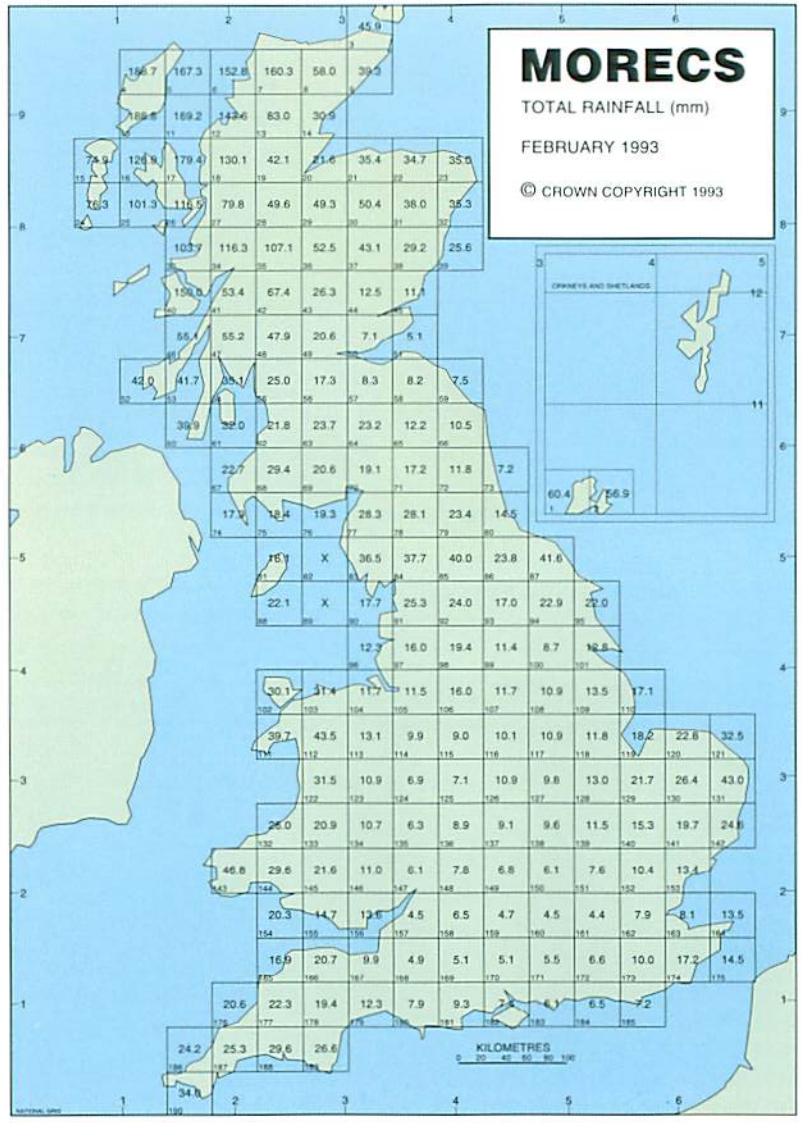
The operational, grid square, version of MORECS gives subscribers a week by week snapshot view of the current soil moisture status over whatever size area of Britain they desire, within hours of the weather measurements being made. For archive purposes the update version, delivered about three months in arrears, gives the definitive picture.

An example of the output of MORECS for TOTAL RAINFALL.

Charts are also available for:

- ❒ Actual Evapotranspiration.
- ❒ Available Water
- ❒ Capacity Crop Stress.
- ❒ Hydrologically Effective Rainfall.
- ❒ Field Capacity.
- ❒ Potential Evapotranspiration.
- ❒ Soil Moisture Deficit.

Further information on MORECS is available in the Met. Office MORECS leaflet.



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SHORT-RANGE POLLUTANT DISPERSION

- ❑ AIR POLLUTION (including airborne diseases and pests)
- ❑ DUST/PARTICULATE POLLUTANTS
- ❑ ODOURS
- ❑ GAMMA DOSE RATES

The Met. Office offers a range of products and services, such as atmospheric data, pollution models and consultancies, which are of use in the area of windborne pollutants.

ATMOSPHERIC DATA:

- ❑ Wind speed and direction, changing with height.
- ❑ Boundary Layer depths/Mixing heights.
- ❑ Pasquill Stability categories.
- ❑ Rainfall.
- ❑ Temperature, changing with height.
- ❑ Humidity.
- ❑ Cloud Cover.
- ❑ Inversion layer frequency.
- ❑ Wet deposition and Boundary Layer heat fluxes.

A more complete description of weather data available is given in the ENVIROMET Environmental Data Services leaflet.

Weather data is offered in formats suitable for most EPA models, the new UK–ADMS model, or it may be customised for your own particular model.

Data may be supplied from the Met. Office's extensive historical data bank, extracted from near real time information or supplied as a forecast for periods up to five days ahead using powerful Met. Office computer models.

MODELS

The main model used by the Met. Office for short-range (up to 30 km) air, odour and dust pollution is the new, state-of-the-art UK–ADMS model. This model was developed by Cambridge Environmental Research Consultants, the Met. Office and National Power, and it was funded by a wide range of interested parties.

UK–ADMS models the lower atmosphere with a physical approach, unlike many other models which use a subjective, empirical approach based around Pasquill Stability Categories, and therefore provides more scientifically robust results.

UK–ADMS is a Lagrangian model which emits a constant stream of particles to be carried along in a "model atmosphere". The model has modules covering:

- ❑ Finite emission (puff).
- ❑ Plume rise.
- ❑ Concentrations (mean and statistical).
- ❑ Deposition (gravitational, dry, wet and radioactive decay).
- ❑ Gamma dose rate.
- ❑ Buildings effects.
- ❑ Complex terrain effects.
- ❑ Coastlines effects.

Fuller details of this model are given in the ENVIROMET Accidental Toxic Emissions leaflet.

Standard EPA gaussian plume models may be purchased by the Met. Office if they are preferred for particular tasks.

ADVANTAGES AND BENEFITS

- ❑ Data quality controlled to Met. Office standards, giving you peace of mind.
- ❑ Long-term database covering the country ensures that your local needs are met to your satisfaction.
- ❑ High quality forecast data from Met. Office computer models enables you to pinpoint problem areas in advance and to take remedial action to minimise any adverse affects.
- ❑ Wide range of model output gives you a choice suitable for your needs and allows you to fulfil your legal obligations at a reasonable cost.
- ❑ State-of-the-art atmospheric dispersion model.
- ❑ Access to standard EPA models.
- ❑ Tailor-made consultancy suitable for your needs will enable you to deal with any health, legal or environmental pressures on pollution.

All these combine to give you a quality service, which will fill your needs at a time, and at a price, suitable for you.

CONSULTANCY SERVICES

A wide range of consultancy services are offered in conjunction with ENVIROMET data and model services and products. Consultancies can range from a short accompanying description of data/model output, through a general analysis of a particular problem, leading on to a full-scale, in-depth report suitable for presentation in court or at a public enquiry. Each consultancy is tailor made to ensure that price and product are suitable for our client's needs.

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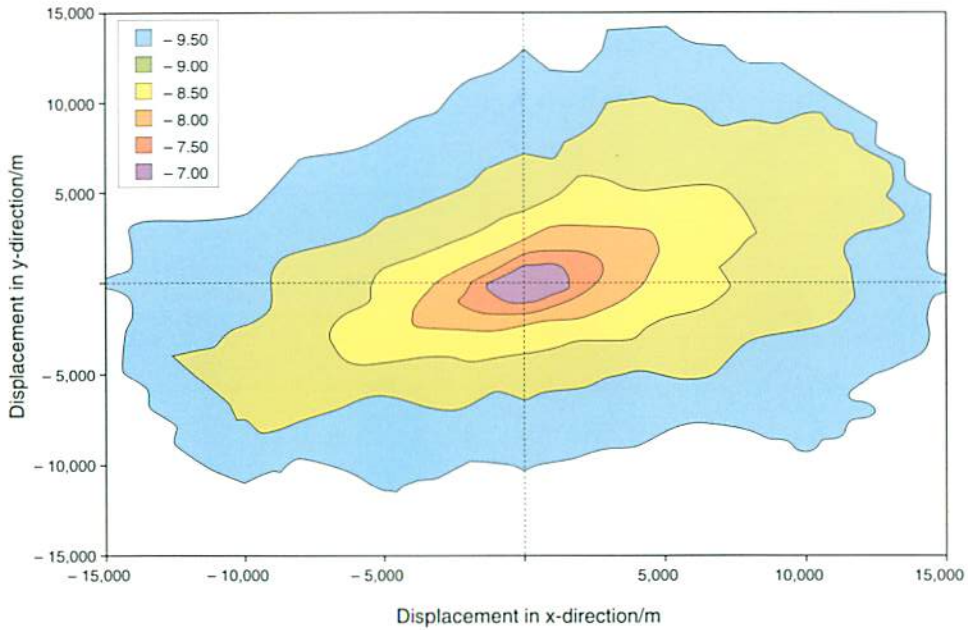
UK–ADMS is able to provide statistical information based on a number of meteorological categories, for use in assessing long-term impact of pollution sources.

The model output shown below is the mean annual hourly average resulting from a meteorological ten-year statistical data set and based on the following input details:

- Continuous emission.
- Source strength of 0.02 g/s.
- Diameter of source 0.1 m.
- Height of source 10 m.

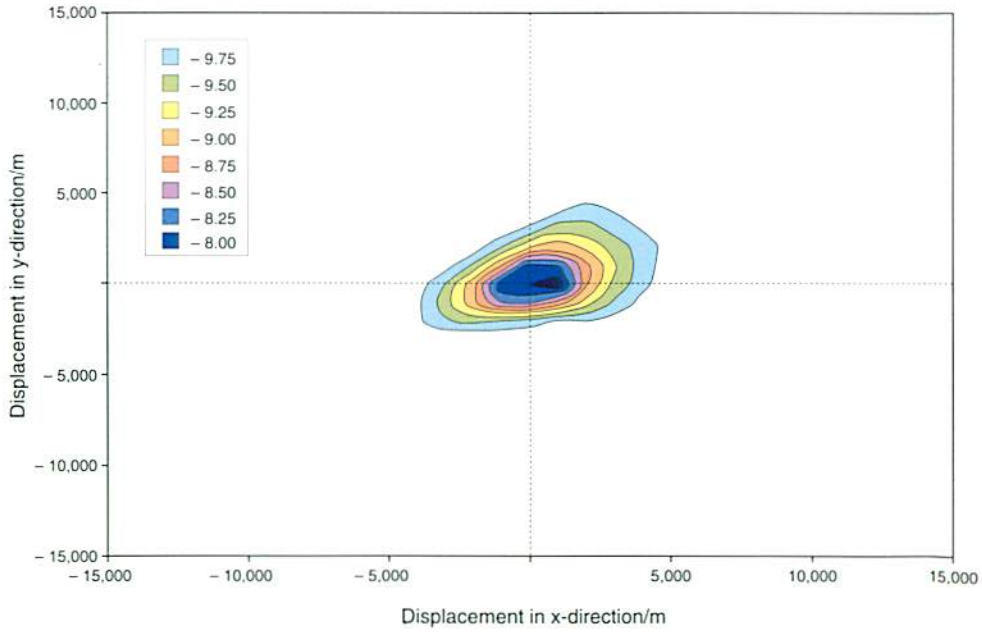
The only input difference between the two model runs was to vary the deposition velocity of the pollutants.

Atmospheric Dispersion
Light material with a deposition velocity of 0.005 m/s



Mean Concentrations/$\log_{10}$ (units/m^3)
At ground level

Atmospheric Dispersion
Heavy material with a deposition velocity of 0.1 m/s



Mean Concentrations/$\log_{10}$ (units/m^3)
At ground level

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URBAN AIR QUALITY

- ❑ **Environmental monitoring**
- ❑ **Air quality event analysis and forecast services**

ENVIRONMENTAL MONITORING

The Met. Office maintains the national meteorological archive and observing network. We can advise on best practices to adopt when setting up a weather station in urban or country areas and on the protocols needed in order for the Met. Office to accept and quality control data.

Over a number of years various automatic weather stations (AWSs) have been developed; some good, some not so good. The Met. Office decided to set its own standards in this area.

Over the last two decades the Meteorological Office has developed and introduced Automatic Weather Stations (AWSs). These stations were initially for our own use, but through collaboration with a private company AWSs are now available for both public and commercial uses.

Advice on the use of automatic weather stations for non meteorologists is contained in the Met. Office booklet "Automatic Weather Measurements".

Met. Office weather observing sites could be used to make other environmental measurements. For instance many of the RIMNET (national radioactivity monitoring network) sensors are on Met. Office sites. The Met. Office also has the potential of offering the use of its telecommunication and data archiving facilities for national or local collation, sorting, quality controlling and re-presentation of air quality data.

AIR QUALITY EVENT ANALYSIS AND FORECAST SERVICES

Past pollution events can be analysed by our specialist consultants, looking for weather correlations using the extensive Met. Office historical database. Wind speed and direction are obviously important elements affecting pollution, but other relevant elements (such as atmospheric stability, surface sensible heat flux, inversion layers, mixing heights) are also available for inclusion.

Once a pollution event/weather element(s) combination is established a pollution warning service can be arranged. This service would forecast the likely occurrence of local pollution events, up to five days ahead.

Work is under way to use Met. Office computer products to electronically deliver pollution forecast data on a very local scale.

ADVANTAGES AND BENEFITS

- ❑ Expert Advice on weather instruments and siting, thus :
  (a) giving as near as possible a representative sample of the air conditions in a complex urban area.
  (b) saving money by using the minimum number of quality sites necessary for your requirements.
- ❑ Tried and tested Automatic Weather Stations performing to Met. Office Standards and giving you reliable data quality controlled by the Met. Office, thus saving you time and money in quality control.
- ❑ Met. Office sites, telecommunication links and data handling resources can be made available. All are quality assured to Met. Office standards, ensuring that you have a worry-free service and no site security costs.
- ❑ Met. Office historical database available for pollution event analysis by trained consultants, enabling you to pinpoint weather element combinations leading to a build up of local pollution.
- ❑ Leading on to possible forecast/warning services, enabling you to:
  - Plan for days of likely pollution.
  - Inform the public of likely risks.
  - Take steps to minimise pollution emissions.
- ❑ Thus assisting you to:
  - Adhere to governmental guidelines.
  - Minimise employer costs and hospital time associated with high pollution level events.
  - Raise the public quality of life.

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Complications of measurements in urban areas

Measurements of weather elements taken in built-up areas often have marked differences from those taken in more exposed green-field sites which are generally representative of rural areas.

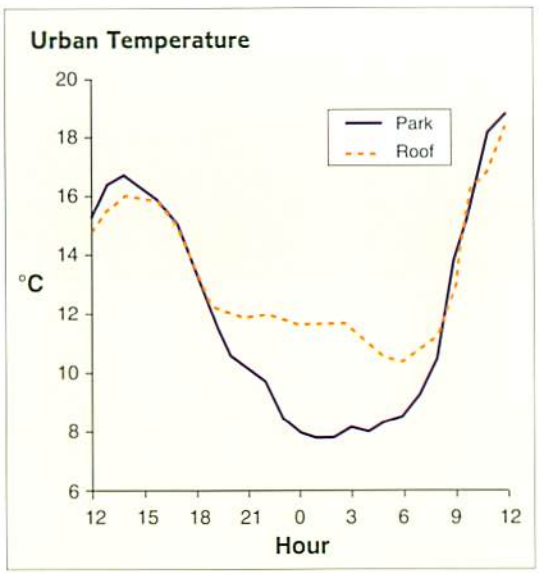
Meteorological measurements taken in urban areas usually represent a set of compromises: the best location for one element may not be an ideal site for another element. Today's instruments will generally make good measurements, but local wind turbulence and heat fluxes due to buildings may lead to values which are not truly representative of the locality.

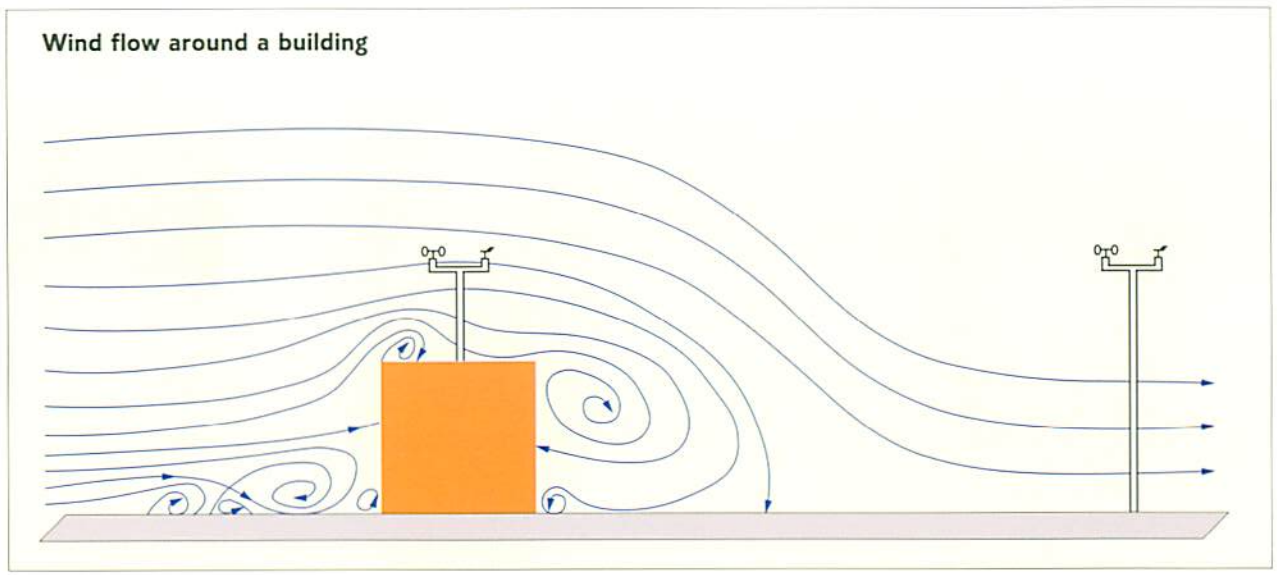
The thermal properties of the urban environment, and the energy used in heating and air-conditioning buildings, can result in marked night-time temperature differences when compared to adjacent open countryside.

The graph shows measurements taken from a London parkland ground-level site and those from a nearby rooftop site 30 m above street level. The sample shown is a worst case example in anticyclonic conditions, where differences greater than 2 °C might occur on about 15 to 25 days a year. The rooftop measurement is probably representative of urbanised high density shops and offices, whereas the park's value is probably similar to suburban back gardens. This urban heat island effect ensures that central London's average night minimum temperature is 1 °C warmer in winter than that measured at Heathrow.

The diagrams on this page will give you some idea of the difficulty in obtaining a true measurement of wind flow and temperature in a built up area.

These are two vital ingredients in the effective modelling and analysis of urban air quality





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ACCIDENTAL TOXIC EMISSIONS

- **Detailed information and analysis now offered commercially as an incident progresses: also available after the event and for contingency planning.**

The emergency services can call, through normal channels on the Met. Office to provide estimates of dispersion at any time, free of charge, following a potentially toxic chemical release. Because of the need for urgency the information provided is rather general in nature, but is adequate for the authorities to act upon.

As the event progresses, or after the event, there is an opportunity to have more precise analyses made using a wider range of meteorological and source data.

The Met. Office will use a new, state-of-the-art, dispersion model called UK–ADMS (United Kingdom Atmospheric Dispersion Modelling System) in accidental toxic emission events.

This model will soon be able to use an extensive historical database for past event analysis; it can use real time data supplied from the extensive Met. Office network of weather reporting stations, and the model will also be developed to enable it to accept forecast data from the Met. Office mesoscale, European and global weather models.

UNITED KINGDOM ATMOSPHERIC DISPERSION MODELLING SYSTEM

The United Kingdom Atmospheric Dispersion Modelling System (UK–ADMS) is the result of over ten man–years of recent research. It was developed by Cambridge Environmental Research Consultants (CERC), National Power and The Meteorological Office, and has been designed to run on a Personal Computer using Microsoft "Windows".

UK–ADMS models the lower atmosphere with a physical approach, unlike any other models which use a subjective empirical approach based around Pasquill Stability Categories, and therefore provides more scientifically robust results.

MAIN FEATURES OF UK–ADMS

Emission Type
- Continuous Emission
- Finite Emission (puff)
- Plume rise

Concentrations
- Calculates mean concentrations over a minimum averaging period of 1 hour
- Produces statistics of concentration fluctuations on time scales of less than 1 hour

Deposition
- Considers four processes – gravitational settling of particles, dry deposition, wet deposition and radioactive decay

Gamma Dose Rate
- Calculates gamma-dose rates beneath the plume

Complex Terrain
- Calculates mean flow and dispersion over hilly terrain of variable roughness

Buildings
- Calculates dispersion of pollution from sources near large buildings

Coastlines
- Models the impact of the growth of an internal boundary layer on the dispersion for winds blowing off the sea

ADVICE AND CONSULTANCY SERVICES

To accompany data and model output, the Met. Office also offers a wide range of consultancy services. These range from a short description and background advice on model data or output, through a general report and advice on a particular emission, to an in-depth report and advisory service up to court or public enquiry level.

Information free of charge to emergency services through normal channels during an incident.

ADVANTAGES AND BENEFITS.

- Historical and real time data quality controlled to Met. Office standards gives you peace of mind.
- Forecast data from Met. Office world class computer models enables you to pinpoint problem areas, thus targeting resources more accurately and saving you money and resources.
- State-of-the-art dispersion model.
- Wide range of consultancy services.
- Very rapid assessment of areas at risk from toxic emissions enabling you to take precautionary measures.
- Detailed assessment of likely levels of deposition.
- Prediction of where to take forestalling action in the event of a protracted release thus minimising health risks and consequent drains on medical resources.

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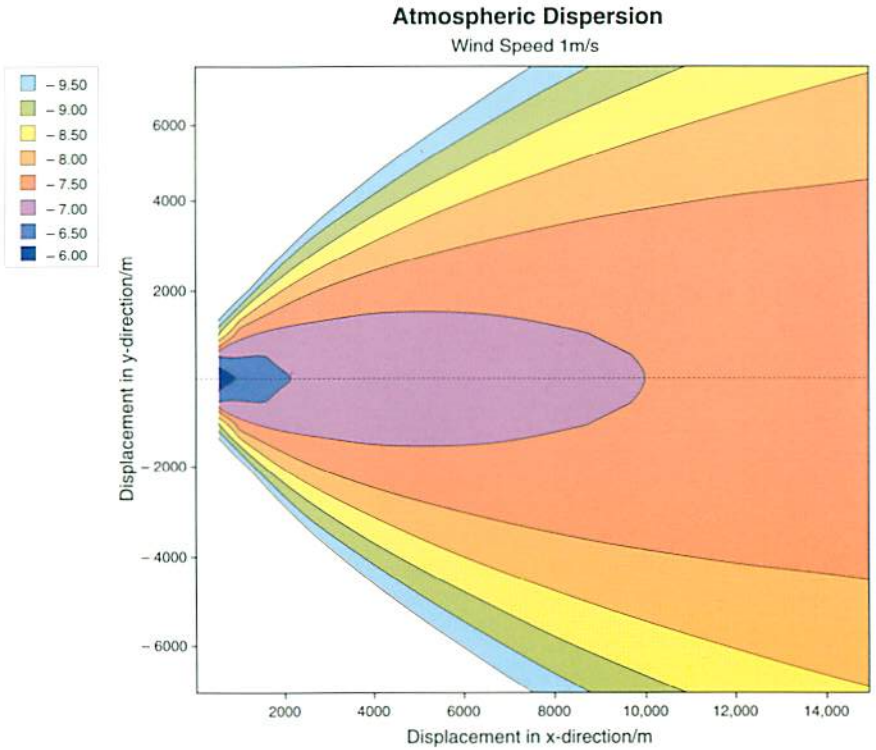
This example illustrates the type of output which can be produced during an emergency for identifying areas at risk. The patterns of dispersion of wind speed of 1m/s and 10m/s with all other input information being identical, are presented for comparison.

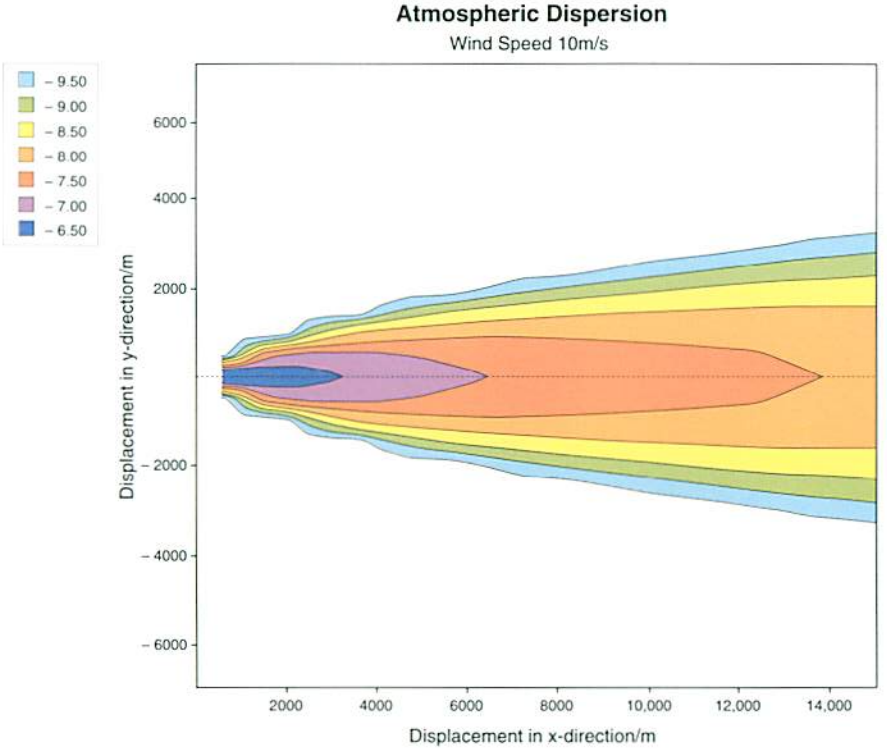
Input details:- convective conditions

❑ Source height	50 m
❑ Source diameter	0.1m
❑ Source strength	1 kg/s
❑ Boundary layer depth	1000 m
❑ Averaging period	1 hour

The figures illustrate the pattern of dispersion of a continuous release when the different wind speeds prevail.
In an actual event these profiles would be superimposed upon appropriate scale maps.



Mean annual hourly concentrations/$\log_{10}$ (units/m^3)
At ground level



Mean annual hourly concentrations/$\log_{10}$ (units/m^3)
At ground level

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NOISE PROPAGATION SERVICES

Expertise and tried and tested models, originally developed for predicting explosive noise propagation on Ministry of Defence firing ranges, are now being applied to civilian uses.

The Met. Office can offer:

- ❑ Analysis of noise records to establish nuisance in relation to weather conditions.
- ❑ Assessments of likely public nuisance from new sources of impact noise as governed by prevailing or extreme weather conditions.
- ❑ Warning services to indicate days when noise will be a problem in your area of concern.
- ❑ Noise consultancies for complex problems. (In conjunction with Salford University.)
- ❑ Data services required for noise propagation models, covering historical, current and forecast (up to five days ahead). These include elements such as low-level temperature inversions, height of the atmospheric boundary layer and change of wind speed and direction with height.

Examples of noise sources for which the Met. Office can supply services:

Gun Clubs
Quarry Blasting
Aero Engine Testing
Grain Driers
Pop concerts.
Pile Driving operations
Bird Scarers
Heliports
Industrial Noise
Demolition Sites

Who can benefit from our services?

Environmental Health Officers
Planning Departments
Environmental Consultants
Originators of impact noise

Advantages and benefits

- ❑ Data quality controlled to Met. Office standards, thus giving peace of mind.
- ❑ Forecast information supplied from world class computer models, giving you accurate information on possible problem days and enabling you to take preventative measures to minimise complaints.
- ❑ Better results than using models which fail to take atmospheric effects into account, thus giving a truer, more useful picture which will allow you to plan your operations with confidence and save resources.

Explosive noise

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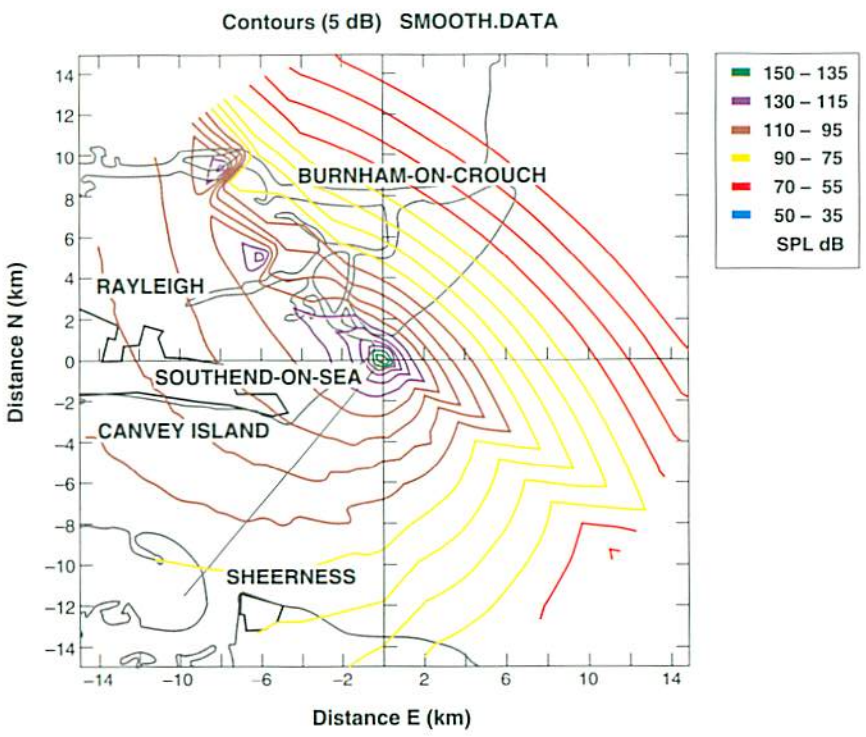
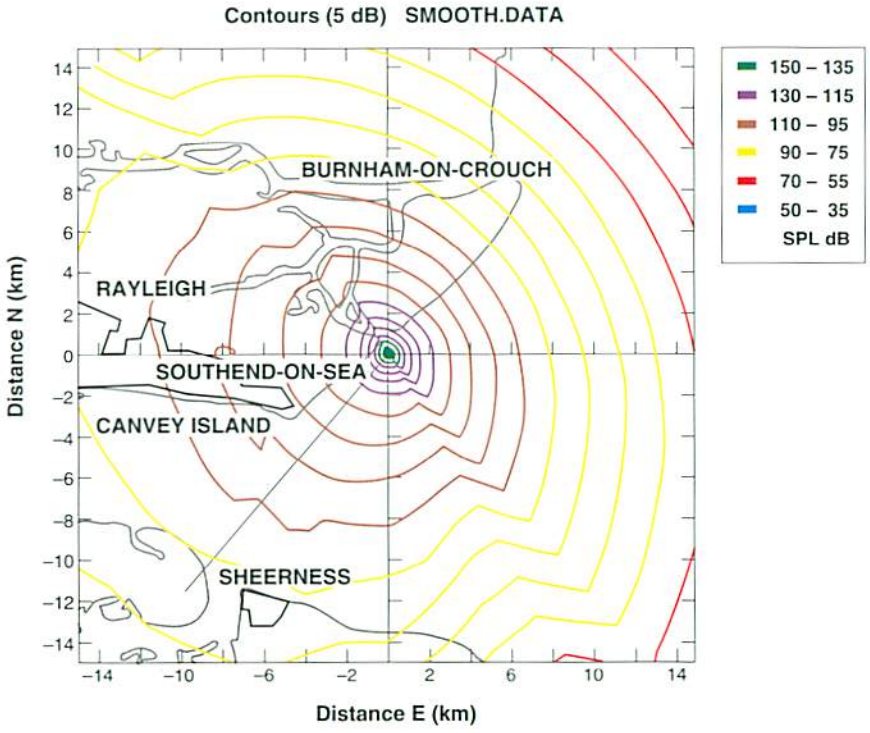
Two examples of noise model output





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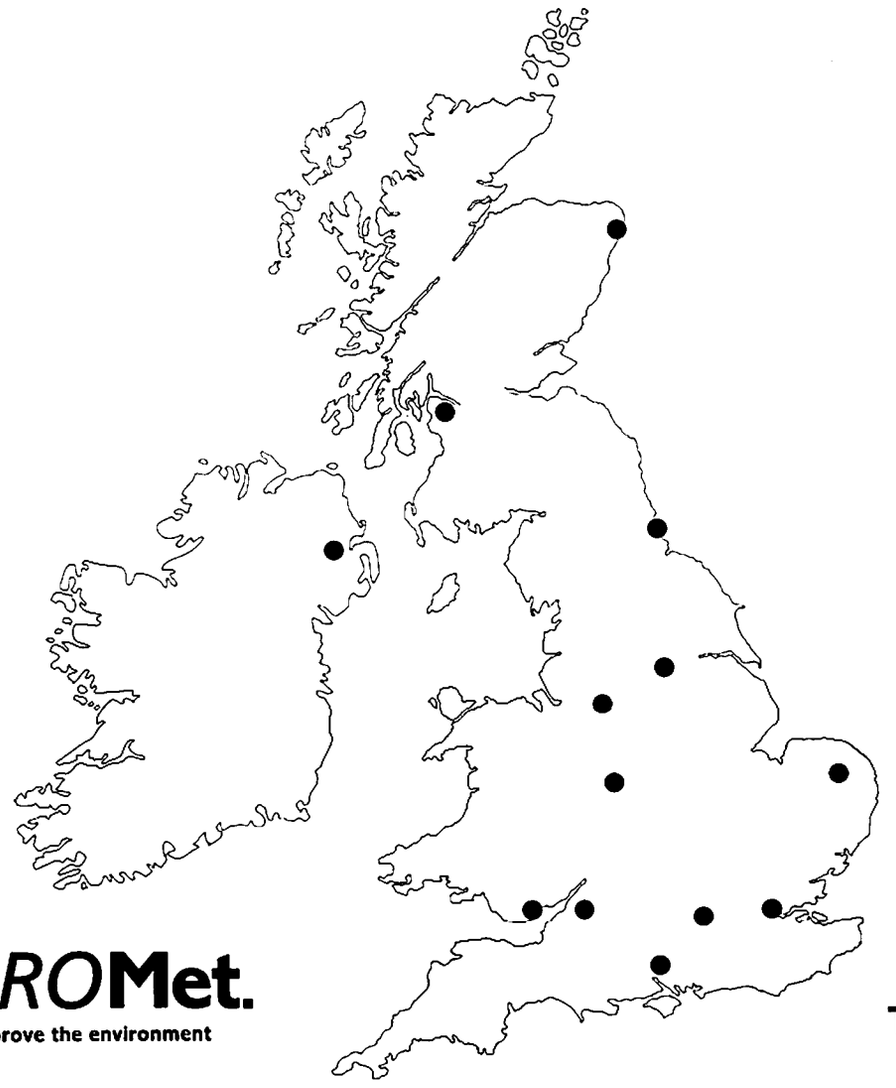
For services available in your area contact the Commercial Manager at your nearest Weather Centre

Aberdeen Tel: 01224 210572 Fax: 01224 210575	**Belfast** Tel: 018494 22804 Fax: 018494 54091	**Birmingham** Tel: 0121-717 0571 Fax: 0121-717 0579	**Bristol** Tel: 0117 9276265 Fax: 0117 9279060	**Cardiff** Tel: 01222 390420 Fax: 01222 390435	**Glasgow** Tel: 0141-248 7272 Fax: 0141-248 3455
Leeds Tel: 0113 2457703 Fax: 0113 2457760	**London** Tel: 0171-696 0573 Fax: 0171-404 4314	**Manchester** Tel: 0161-477 1017 Fax: 0161-476 0714	**Newcastle** Tel: 0191-232 3808 Fax: 0191-261 4965	**Norwich** Tel: 01603 630164 Fax: 01603 629832	**Southampton** Tel: 01703 220646 Fax: 01703 228846

Head Office: The Meteorological Office, London Road, Bracknell, Berkshire RG12 2SZ
International Commercial enquires: Bracknell Head Office +44 (0)1344 856283



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